d'Anthropologie et d'Ethnographie de Moscow has not only taken an active part in the Universal Exposition, but has also published a pamphlet giving a brief sketch of the society and the work which it has done for the ethnology of the countries within Russian territory.

## GEOGRAPHY AND TRAVELS.[1]

UNKNOWN AFRICA.—M. H. Duveyrier has recently read a learned paper before the Paris Geographical Society in which he divides the unexplored portions of Africa into six great regions. These regions are: 1. The Sahara and the Libyan Desert, measuring 5,750,000 square kilometres, and notwithstanding its desolate aspect containing in its ancient populations and rich oases much of great interest. 2. In the west the country between the Joliba and the coast of Guinea, covering the surface of 1,200,000 square kilometres. 3. In the center north of the equator the upper courses and the sources of the Benué and the Shari composing an area of 800,000 square kilometres in which to seek to complete our knowledge of the basins of the Nile and the Shari, and to discover the sources of the latter and those of the Benué. 4. In the southern equatorial zone adjacent to the preceding and embracing the head waters of the Nile, the sources of the Ogowé and the basin of the Congo, extending over 2,000,000 square kilometres, some of the greatest problems of African geography remain to be decided. 5. In the south the basin of the Cunene and the districts about Angola and Benguela. 6. Finally, in the east, the region which forms a triangle culminating in Cape Gardafui whose interior is totally unexplored, and presents subjects of investigation not only geographical, but also historical of the highest interest.

Adding together the areas of these six great lacunæ we find they amount to upwards of 11,000,000 square kilometres—more than one-third of the African continent. But there is no reason to be discouraged at this large figure. Since the beginning of the present century the exploration of Africa has progressed at a mean rate of 234,285 square kilometres per year, and if it goes on at this rate, the whole of the African interior ought to be known in less than forty-eight years. But this calculation takes no account of the geometric progression of the figure of these discoveries which now produce in one year more than in the first twenty years of the century.

AFRICAN EXPLORATION.—Dr. Gerhard Rohlfs arrived at Tripolis on the 24th of October last. He expects to proceed early in December to Kufrah and thence to Wadai. He will then endeavor to trace the rivers Shari and Benué to their sources, and to explore the region intervening between them and the rivers

[1] Edited by ELLIS H. YARNALL, Philadelphia.

Ogowé and Congo. He is accompanied by a zoölogist, Dr. Stecker. The German African Association has granted him $7,500, and the German Emperor has entrusted him with valuable presents for the ruler of Wadai, in recognition of the kindness shown Dr. Nachtigal.

M. Paul Solleilet, who endeavored a few years ago to open up a commercial route between Algiers and Senegal, started from Bordeaux in the early part of 1878, on a second expedition with the same object for Saint Louis in Senegal. From there he proceeded to Backel, 250 leagues from the mouth of the Senegal river. Leaving there on the 8th of June, he arrived at Kuniakaro on the 23d of that month. When last heard from he was on the point of starting for Sego on the Niger. He proposes to winter in that town, and descend the river as far as Timbuktu in the ensuing spring. From thence he hopes to go to In-Salah and from thence to Algiers.

The feasibility of connecting the depression of the Shot-el-Jerid with the Mediterranean, and thus flooding the Algerian Sahara, is being investigated by Capt. Roudaire at the expense of the French Minister of Education. He has with him Dr. André who will examine into the natural history of the country.

The Portugese African Expedition, under Major Serpa Pinto, left Benguela on November 12, 1877, for Bihé, and reached the latter place in the following March. From particulars gathered by the *Academy* from Lisbon journals, we learn that they found the porter-difficulty even greater on the west than on the east coast, because as a rule the natives are only willing to engage for short journeys and specific destinations. At Bihé the explorers resolved to separate into two parties; Messrs. Capello and Ivens starting in a northern direction, whilst Major Serpa Pinto, on May 18, 1878, was on the eve of departing for the Upper Zambesi, intending to reach Zumbo early next year. This journey is likely to be very difficult, owing to the small escort and limited amount of goods taken and the hostile character of the tribes to be encountered. He proposes first to explore the region between the Cubango and the Zambesi. The geographical and meteorological observations already obtained are said to be very interesting. The Cubango has its source at a great distance west of Bihé, near that of the Cunene at Bailundo. The streams flowing to the west directly to the sea, or north into the Quanza, or south into the Cunene, have their sources in the vast marshy depressions of the country, between 12° 30′ and 13° S. latitude.

A successful experiment in the introduction of trained elephants from India into Africa has been made this year by Col. Gordon in Egypt. The elephants were first taken to Khartum and thence marched to Duffli, where they were employed in carrying all kinds of heavy goods. During their march they swam across the Nile three times. A portion of their journey from the

Sobat to Bahr was over territory never before traversed. The negroes along the line of march were frightened by them and made no attempt to attack the party. The elephants have gradually learned to live on leaves and grass as the wild elephants do, and keep in first rate condition. Col. Gordon consequently advises travelers to the interior from Zanzibar to use elephants, and thus avoid the necessity for a host of porters—a never ending source of delay and annoyance.

The Abbé Debaize, for whose scientific mission to Central Africa the French Government has apportioned a sum of 100,000 francs, reached Zanzibar early in June of last year. After the inevitable delay in obtaining porters and supplies, he started at the head of a caravan of 400 persons from Kikoka near Bagamoyo, on August 6th, and was last heard from at Mpwapwa, on September 1st. He has a good knowledge of Arabic, Coptic and of some East African languages, and has recently received instructions in Natural History from Milne-Edwards and from Capt. Mouchez, of the Paris Observatory, for astronomical observation.

The Belgian East African Expedition sent out under the auspices of the International African Association, at Brussels, after very great delay and several changes in its corps (caused by the death of two and the resignation of other members), and now conducted by M. M. Cambier, Wantier and Dutrieux, set out from Bagamoyo on July 4th. The Expedition included probably over 500 natives, of whom, however, 325 soon deserted with a large quantity of valuable goods. Leaving his companions to obtain other porters in place of the deserters, M. Cambier pushed on by a route half way between those of Mr. Stanley and Mr. Price to Mpwapwa. On August 13th, he started for Urambo in Unyamwesi where he contemplates founding the first of the "*stations hospitalières et scientifiques.*" Dr. Dutrieux had reached Mpwapwa on August 26th.

Ten Catholic Missionaries from Algeria also departed from Bagamoyo, on June 16th, 1878, and arriving at Mpwapwa on July 27th, separated—one party going to the Victoria Nyanza and the remainder to Ujiji. These missionaries have been practiced in the use of scientific instruments.

The *Academy* states that the London Missionary Society has heard of the arrival of its Tanganyika mission party at Ujiji. The march from Urambo, the capital of Unyamwesi, occupied but eighteen days, and the news "reached London in the short space of seventy-eight days, of which forty-five only were required for the transmission of the letter from Ujiji to Zanzibar, a distance of some 650 miles, and yet but eight years ago Dr. Livingstone was looked upon as lost, though he was residing at the former place."

Mr. Keith Johnston, the leader of the expedition which the Committee of the African Exploration Fund are about to dispatch

from the east coast of Africa to Lake Nyassa,[1] left England for Zanzibar on the 14th of November last. *Nature* states that his second in command, Mr. Thomson, has had an excellent training as a geologist, and it is expected that he will make important contributions to our knowledge of the geology of the region to be visited.

Sir Fowell Buxton stated, at a recent meeting of the Royal Geographical Society, that during the last year forty miles of the road from Dar-es-Salaam to the north end of the Nyassa have been made. The natives give no trouble and gladly use the road, but continue to walk in Indian file, so that the rapid growth of vegetation is but little impeded. One of the missionaries at Livingstonia, Lake Nyassa, departed, in June, 1878, on a journey through a portion of the country west of the lake.

The mission sent out by the Church Missionary Society to the Victoria Nyanza and Uganda has not been abandoned, although of the four who reached the lake in 1877, one, Dr. Smith, died of disease, and Lieut. Smith and Mr. O'Neil were murdered. The Rev. C. T. Wilson was at King Mtesa's capital, Rubaga, in Uganda, when the news of the massacre of his companions reached him, when he crossed the lake to Speke's Bay and made his way to Unyanyembe. The Society, however, has at least fourteen agents in the field, some of whom are carpenters, mechanics and agriculturists, and expect to have a chain of mission stations between Speke's Bay and Zanzibar. Mr. Wilson returned to Uganda in January, 1878, and up to the date of his last letter (May 9, 1878), was living comfortably at Rubaga, where he awaits the arrival of three colleagues sent out by the Nile route. From letters quoted in the *Academy* we learn that he has been favorably impressed with the quickness and skill in imitation of the Waganda. In his opinion they deserve the title of "the Chinese in Africa." They excel in basket making and in working in iron, copper and brass. They also dress skins beautifully. He also writes that the north-west corner of the Victoria Nyanza is thickly dotted with islands, some of which are fifteen miles long. The people say there are four hundred of them, and he has himself seen fifty or sixty. They are all called "Sasse" or "Sesse Islands," which may be translated "Isles of the Fishermen." These islands by dead reckoning extend to about S. lat. 0° 40′. In the winter and spring of 1877 the Nyanza slowly rose until the middle of May, when the maximum of two feet above the ordinary level was reached, and it then began to recede. In January, 1878, however, the water was within an inch or an inch and a half of its maximum in the previous May. The *Academy* remarks that in 1878, there was "a good Nile," which was not the case in 1877.

The Church Missionary Society, the *Academy* also states, has decided to despatch an expedition to the south-western end of the

[1] See AMERICAN NATURALIST for November, 1878, page 763.

Albert Nyanza, and in Dr. Behm's *Monatsbericht* in the October *Mittheilungen*, it is announced that the Swedish Mission Society, assisted by a wealthy English gentleman, proposes also to establish a station at Fatiko, northeast of the lake. The latest explorations have considerably reduced the dimensions of the Albert Nyanza. Romolo Gessi placed its southern limit at 0° 50′ N. lat. Stanley discovered the Beatrice Gulf at about 0° 25′ N. lat., and believes it to be a portion of a hitherto unknown body of water—the Muta Nzige, and not connected with the Albert. Col. Mason Bey, who last circumnavigated the Albert Lake, shows that its shape is different, and its dimensions even smaller than were supposed by Gessi. His compass survey was checked by four astronomical observations. The lake is rectangular, not elliptical, in shape, and Mason Bey places its southern limit at N. lat. 1° 10′. Both Gessi and Mason Bey agree that no large river discharges itself into the lake at its southern extremity, nor is there any communication with any other large lake. The *Athenæum* notices some views put forth on the subject by an Italian geographer, who suggests that the Albert Nyanza is simply a back water or reservoir of the Murchison or Victoria Nile, which would account for the varying dimensions of the lake. The *Athenæum* also doubts if the supposed isolation of the Tanganyika from the basin of the Albert is yet satisfactorily proved.

SUMMARY OF THE FIELD WORK OF THE UNITED STATES GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES, UNDER PROF. F. V. HAYDEN, DURING THE SEASON OF 1878.—During the past season the work of the United States Geological and Geographical Survey, under the direction of Prof. F. V. Hayden, was continued northward into portions of Wyoming and Montana Territories. The usual appropriation for the survey was not passed by Congress until July, rendering the field season very short, yet the results were of considerable magnitude and of much importance.

The survey proper was divided into four parties, one of which was devoted to the extension of the primary triangulation to the northward, two were engaged in topographic and geologic work, and the fourth performed photographic and special geologic duty. All the parties left the Union Pacific Railroad from Point of Rocks and Green River Stations about July 25, and proceeded northward toward the Yellowstone National Park. To the second division was assigned the duty of making an exhaustive survey of the park and its surroundings, and to the third the exploration of the Wind River range and the Snake River country. The primary triangulation was extended over about twelve thousand square miles. Eight primary stations were occupied, among them Wind River, Fremont's and Grand Teton Peaks, which are among the most difficult and hazardous of ascent on the continent. This division would have performed double this amount of work had

a band of hostile Indians not robbed it of its entire outfit about the middle of the season.

The second division made a very detailed survey of the National Park, securing the materials for the preparation of a topographical and geographical map on a scale of one mile to one inch. The geologist not only studied the geology minutely, but also sketched every square mile of the area. An unusually interesting and valuable collection of volcanic rocks and hot-spring specimens was obtained. The entire collection of the survey, which are of a varied character, will amount to about three tons weight.

The third division explored with equal care the Wind River and Teton ranges of mountains, a region of which comparatively little was previously known. The peak named by the survey Fremont's Peak was found to be over 14,000 feet in height above the sea, with no trace that any human being had ever previously reached its summit. Three complete glaciers were discovered on the east side of the Wind River Mountains, the first ever known to exist east of the Pacific coast. The old glaciated rocks and morainal deposits were found on a remarkably grand scale in both the Wind River and Teton ranges.

The object of again surveying the Yellowstone Park was to bring it under the system of triangulation which had been employed with so much success in Colorado and to make the entire work uniform. All the old hot-spring basins were resurveyed in great detail, and several new ones were discovered and mapped. Soundings and temperatures of several thousand hot springs were taken. The history and habits of the geysers were carefully studied. The photographer of the survey obtained over fifty fine views of the bowls and other curious ornamental details of the Hot Springs.

The results of the season's labors, though a short one, have been on the whole very satisfactory. About 12,000 square miles of very difficult country were surveyed, much of it in minute detail, and a mass of observation secured for the twelfth annual report, which will make it of more general interest and value than any of the preceding.

The district assigned to this survey by this department for the next Atlas comprises all the area of the Territories of the United States north of latitude 41° 45′, east of meridian 117° and west of meridian 94°. It is estimated that the mapping of this area will occupy five years more, and when this is completed, the survey will have mapped over one-fourth the territory of the United States west of the one hundredth meridian.

GEOGRAPHICAL NEWS.—Petermann's *Mittheilungen* will be continued and conducted by Dr. E. Behm, who has been long connected with Justus Perthes Establishment, is one of the editors of the well-known *Bevölkerung der Erde*, and is the author of the

excellent monthly summaries of geographical news in this most important of geographical journals. Besides others, the number for November contains an article on the use of elephants in African exploration, written by Dr. Petermann shortly before his death, and one concerning D'Alberti's New Guinea Exploration, with a map of the Fly River.——The *Geographical Magazine* for November contains the best map of the seat of war in Afghanistan which has yet appeared, both as regards accuracy, fullness of information and excellence in the mechanical execution. With the December number this periodical ceased to be published, but is replaced by the *Proceedings of the Royal Geographical Society and Monthly Geographical Record*, under the charge of the Secretary of the Society, Mr. Clements R. Markham, who so ably conducted the magazine.——Several new geographical monthly periodicals have recently appeared in Europe. The *Deutsche Rundschau für Geographie und Statistik* is edited by Prof. Arendts, of Munich, and published by Hartleben, Vienna. *Aus fernen Zonen*, published by Mutze, Leipzig, is especially intended for the reception of communications from members of the various Christian missions in the less known portions of the globe; whilst from Paris the *Annales de l'Extrême Orient*, edited by Count Meyners d'Estrey, of the Indian press, expects to keep the scientific world informed of literary and geographical progress in Southern Asia, and especially in the Dutch Indies and in Dutch Oriental literature.——Dr. Nachtigal, the distinguished African traveler, has been elected President of the Berlin Geographical Society.——The *Athenæum* states that Mr. Johnson, the present Governor of Ladakh, when connected with the Indian Survey of 1865, ascended Peak E. 61 of the Kuen Lun range, whose height it now appears is no less than 23,890 feet! This is believed to be the greatest height above the level of the sea attained by any traveler on foot. The plains at the base of the Peak have probably an altitude of nearly 18,000 feet.

## MICROSCOPY.[1]

Removal of Air from Microscopic Specimens.—Much difficulty has been experienced by the working microscopist in removing air from his specimens. If he wishes to mount wood-sections the difficulty is increased. Some may suppose that such an undertaking is physically impossible; for hitherto, in spite of all the pains and labor taken, unless by some lucky stroke, as it were, bubbles of air will still be left in the objects, and the slide becomes entirely worthless as a perfect specimen.

Various methods have been adopted to remove these bubbles of air, with greater or less success. One method has been to soak the specimens, after they have been cut, in different fluids for some length of time. The favorite fluids have been turpen-

[1] This department is edited by Dr. R. H. Ward, Troy, N. Y.